CLAIMS

What is claimed is:

1. An apparatus for converting a non-return-to-zero (NRZ) data signal to a return-to-zero (RZ) data signal, the apparatus comprising an amplifier configured to generate an amplified RZ data signal corresponding to the NRZ data signal based on (i) the NRZ data signal and (ii) a clock signal synchronized with the NRZ data signal. .

2. The invention of claim 1, wherein the amplifier is a differential amplifier configured to generate the amplified RZ data signal based on a comparison between a first signal corresponding to the NRZ data signal and a second signal corresponding to the clock signal.

3. The invention of claim 2, wherein the first signal is the NRZ data signal and the second signal is the clock signal offset by a DC offset value.

4. The invention of claim 3, wherein the width of pulses representing data in the amplified RZ data signal is controlled by the DC offset value.

5. The invention of claim 2, further comprising circuitry configured to condition at least one of the NRZ data signal and the clock signal to produce at least one of the first and second signals.

6. The invention of claim 2, wherein:

(i) if the first signal is greater than the second signal, the amplified RZ data signal is at a low level; and

(ii) if the first signal is less than the second signal, the amplified RZ data signal is at a high level.

7. The invention of claim 2, wherein the differential amplifier comprises a constant current source and two switches connected to the current source, wherein the first and second signals are applied to said two switches to generate the amplified RZ data signal.

8. The invention of claim 1, wherein the amplifier comprises two or more amplification stages.

9. The invention of claim 1, wherein the apparatus is implemented as an integrated circuit.

10. The invention of claim 1, wherein:

the NRZ data signal is a trunk NRZ data signal; and

the apparatus further comprises a multiplexer configured to combine two or more tributary NRZ data signals into the trunk NRZ data signal.

11. The invention of claim 10, wherein the multiplexer is further configured to generate the clock signal.

12. The invention of claim 11, wherein the multiplexer includes a phase-locked loop circuit configured to lock the phase of the clock signal to the trunk NRZ data signal.

13. The invention of claim 1, further comprising an electro-optic (E/O) modulator configured to receive an optical input from a laser and to modulate said optical input using the amplified RZ data signal to output an optical RZ data signal corresponding to the amplified RZ data signal.

14. The invention of claim 13, further comprising the laser, wherein said laser is configured to generate continuous wave light emission.

15. The invention of claim 1, further comprising a multiplexer configured to combine two or more tributary NRZ data signals into the NRZ data signal, wherein:

the amplifier is a differential amplifier, comprising a constant current source and two switches connected to the current source, wherein a first signal corresponding to the NRZ data signal and a second signal corresponding to the clock signal are applied to said two switches to generate the amplified RZ data signal based on a comparison between said first and second signals.

16. The invention of claim 15, further comprising

a laser configured to generate continuous wave light emission; and

an electro-optic (E/O) modulator configured to receive an optical input from the laser and to modulate said optical input using the amplified RZ data signal to output an optical RZ data signal corresponding to the amplified RZ data signal.

17. A method for converting a non-return-to-zero (NRZ) data signal to a return-to-zero (RZ) data signal, the method comprising the steps of:

(a) generating one or more control signals based on (i) the NRZ data signal and (ii) a clock signal synchronized with the NRZ data signal; and

(b) generating an amplified RZ data signal corresponding to the NRZ data signal based on said one or more control signals.

18. The invention of claim 17, wherein step (b) comprises the step of generating the amplified RZ data signal based on a comparison between a first signal corresponding to the NRZ data signal and a second signal corresponding to the clock signal.

19. The invention of claim 18, wherein the first signal is the NRZ data signal and step (b) comprises the step of offsetting the clock signal by a DC offset value to generate the second signal.

20. The invention of claim 17, wherein:

the NRZ data signal is a trunk NRZ data signal; and

step (a) comprises the step of combining two or more tributary NRZ data signals into the trunk NRZ data signal.